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Instructions for use NORADRENALINE high sensitive ELISA



BA E-5200R



For research use only – Not for use in diagnostic procedures

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Related Products:

- ADRENALINE high sensitive ELISA
- DOPAMINE high sensitive ELISA
- 2-CAT high sensitive ELISA
- 3-CAT high sensitive ELISA

1. Intended use and principle of the test

Enzyme Immunoassay for the quantitative determination of noradrenaline (norepinephrine). Flexible test system for various biological sample types and volumes.

Noradrenaline (norepinephrine) is extracted by using a cis-diol-specific affinity gel, acylated and then converted enzymatically.

The subsequent competitive ELISA uses the microtiter plate format. The antigen is bound to the solid phase of the microtiter plate. The derivatized standards, controls and samples compete with the solid phase bound analytes for a fixed number of antibody binding sites. After the system is in equilibrium, free antigen and free antigen-antibody complexes are removed by washing. The antibody bound to the solid phase is detected by an anti-rabbit IgG-peroxidase conjugate using TMB as a substrate resulting in a colour reaction. The reaction is monitored at a wavelength of 450 nm.

Quantification of unknown samples is achieved by comparing their absorbance with a reference curve prepared with known standard concentrations.

2. Procedural cautions, guidelines and warnings

- (1) This kit is intended for professional use only. Users should have a thorough understanding of this protocol for the successful use of this kit. Only the test instruction provided with the kit is valid and must be used to run the assay. Reliable performance will only be attained by strict and careful adherence to the instructions provided.
- (2) The principles of Good Laboratory Practice (GLP) must be followed.
- (3) In order to reduce exposure to potentially harmful substances, wear lab coats, disposable protective gloves and protective glasses where necessary.
- (4) All kit reagents and specimens should be brought to room temperature and mixed gently but thoroughly before use. For dilution or reconstitution purposes, use deionized, distilled, or ultrapure water. Avoid repeated freezing and thawing of reagents and specimens.
- (5) The microplate contains snap-off strips. Unused wells must be stored at 2 8 °C in the sealed foil pouch with desiccant and used in the frame provided. Microtiter strips which are removed from the frame for usage should be marked accordingly to avoid any mix-up.
- (6) Duplicate determination of sample is highly recommended.
- (7) Once the test has been started, all steps should be completed without interruption. Make sure that the required reagents, materials, and devices are prepared for use at the appropriate time.
- (8) Incubation times do influence the results. All wells should be handled in the same order and time intervals.
- (9) To avoid cross-contamination of reagents, use new disposable pipette tips for dispensing each reagent, sample, standard and control.
- (10) A standard curve must be established for each run.
- (11) The controls should be included in each run and fall within established confidence limits. The confidence limits are listed in the QC-Report provided with the kit.
- (12) Do not mix kit components with different lot numbers within a test and do not use reagents beyond expiry date as shown on the kit labels.
- (13) Avoid contact with Stop Solution containing 0.25 M H_2SO_4 . It may cause skin irritation and burns. In case of contact with eyes or skin, rinse off immediately with water.
- (14) TMB substrate has an irritant effect on skin and mucosa. In case of possible contact, wash eyes with an abundant volume of water and skin with soap and abundant water. Rinse contaminated items before reuse.
- (15) For information about hazardous substances included in the kit please refer to Safety Data Sheet (SDS). The Safety Data Sheet for this product is made available directly on the website of the manufacturer or upon request.
- (16) Kit reagents must be regarded as hazardous waste and disposed of according to national regulations.
- (17) In case of any severe damage to the test kit or components, the manufacturer has to be informed in writing, at the latest, one week after receiving the kit. Severely damaged single components must not be used for a test run. They must be stored properly until the manufacturer decides what to do with them. If it is decided that they are no longer suitable for measurements, they must be disposed of in accordance with national regulations.

3. Storage and stability

Store kit and reagents at 2 - 8 °C until expiration date. Do not use kit and components beyond the expiry date indicated on the kit labels. Once opened, the reagents are stable for 2 months when stored at 2 - 8 °C. Once the resealable pouch of the ELISA plate has been opened, care should be taken to close it tightly again including the desiccant.

4. Materials

4.1 Contents	of the kit			
BA D-0032	Ш 96 Micro	titer Plate – ready to use		
Content:	1 x 96 wells, empty in a resealable pouch			
BA D-0090	FOILS Adhe	sive Foil – ready to use		
Content:	Adhesive foils in a resealabl	e pouch		
Number:	1 x 4 foils			
BA E-0030	WASH-CONC 50x Wash	Buffer Concentrate – concentrated 50x		
Content:	Buffer with a non-ionic dete	rgent and physiological pH		
Volume:	1 x 20 ml/vial, purple cap			
BA E-0040	CONJUGATE Enzy	me Conjugate – ready to use		
Content:	Goat anti-rabbit immunoglo	bulins conjugated with peroxidase		
Volume:	1 x 12 ml/vial, red cap			
Description:	Species is goat			
BA E-0055	SUBSTRATE Subst	t rate – ready to use		
Content:	Chromogenic substrate cont and hydrogen peroxide	aining 3,3',5,5'-tetramethylbenzidine, substrate buffer		
Volume:	1 x 12 ml/vial, black cap			
BA E-0080	STOP-SOLN Stop	Solution – ready to use		
Content:	0.25 M sulfuric acid			
Volume:	1 x 12 ml/vial, grey cap			
BA E-0231	Ш NAD NMN Norae	drenaline Microtiter Strips – ready to use		
Content:	1 x 96 wells (12x8) antigen with desiccant	precoated microwell plate in a resealable yellow pouch		
BA E-5210	NAD-AS Norae	drenaline Antiserum – ready to use		
Content:	Rabbit anti-noradrenaline an preservative, yellow coloure	ntibody in buffer with proteins and non-mercury d		
Volume:	1 x 6 ml/vial, yellow cap			
Description:	Species of antibody is rabbi	, species of protein in buffer is bovine		
BA E-6612	ACYL-REAG Acyla	tion Reagent – ready to use		
Content:	Acylation reagent in DMSO			
Volume:	1 x 3 ml/vial, white cap			
BA R-0050	ADJUST-BUFF Adjus	stment Buffer – ready to use		
Content:	TRIS buffer			
Volume:	1 x 4 ml/vial, green cap			
BA R-4617	TE-BUFF TE Bu	Iffer – ready to use		
Content:	TRIS-EDTA buffer			
Volume:	1 x 4 ml/vial, brown cap			
BA R-6611	ACYL-BUFF Acyla	tion Buffer – ready to use		
Content:	Buffer with light alkaline pH	for the acylation		

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4.2 Calibration and Controls

Standards and Controls - ready to use

Cat. no.	Component	Colour/Cap	Concentration [ng/ml] NAD	Concentration [nmol/l] NAD	Volume/ Vial
BA R-5601	STANDARD A	white	0	0	4 ml
BA R-5602	STANDARD B	yellow	0.2	1.2	4 ml
BA R-5603	STANDARD C	orange	0.6	3.5	4 ml
BA R-5604	STANDARD D	blue	2	12	4 ml
BA R-5605	STANDARD E	grey	8	47	4 ml
BA R-5606	STANDARD F	black	32	189	4 ml
BA R-5651	CONTROL 1	green	Refer to QC-Report	-	4 ml
BA R-5652	CONTROL 2	red	and acceptable ran	ge.	4 ml
Conversion:	noradrenaline [I	ng/ml] x 5.91 =	noradrenaline [nmol/	(1]	

Content: Acidic buffer with non-mercury stabilizer, spiked with defined quantity of noradrenaline.

4.3 Additional materials required but not provided in the kit

- Water (deionized, distilled, or ultra-pure)
- Absorbent material (paper towel)

4.4 Additional equipment required but not provided in the kit

- Calibrated precision pipettes to dispense volumes between 1 750 μl; 1 ml
- Microtiter plate washing device (manual, semi-automated or automated)
- ELISA reader capable of reading absorbance at 450 nm and if possible 620 650 nm
- Microtiter plate shaker (shaking amplitude 3 mm; approx. 600 rpm)
- Vortex mixer
- Temperature controlled incubator (37 °C) or similar heating device

5. Sample collection, handling and storage

Storage: up to 6 hours at 2 – 8 °C; for longer periods (up to 6 months) at -20 °C or -80 °C. *Advice for the preservation of the biological sample*: to prevent catecholamine degradation, add EDTA (final concentration 1 mM) and sodium metabisulfite (final concentration 4 mM) to the sample.

6. Test procedure

Allow all reagents and samples to reach room temperature and mix thoroughly by gentle inversion before use. Number the Microtiter Plate, Extraction Plate and microwell plates (Microtiter Strips which are removed from the frame for usage should be marked accordingly to avoid any mix-up). Duplicate determinations are recommended.

The binding of the antisera and of the enzyme conjugate and the activity of the enzyme are temperature dependent. The higher the temperature, the higher the absorption values will be. Varying incubation

times will have similar influences on the absorbance. The optimal temperature during the enzyme immunoassay is between 20 – 25 °C.

If the product is prepared in parts, unused wells in Extraction Plates should be covered to avoid contamination. After preparation, the used wells must be labelled to prevent double use.

During the overnight incubation at 2 - 8 °C with the antiserum, the temperature should be uniform all over the ELISA plate to avoid any drift and edge-effect.

In case of overflow, read the absorbance of the solution in the wells within 10 minutes, using a microplate reader set to 405 nm.

6.1 **Preparation of reagents and further notes**

Wash Buffer

Dilute the 20 ml Wash Buffer Concentrate **WASH-CONC 50X** with water to a final volume of 1000 ml. Storage: 2 months at 2 - 8 °C

Enzyme Solution

Reconstitute the content of the vial **ENZYME** with 1 ml water (deionized, distilled, or ultra-pure) and mix thoroughly. Add 0.3 ml of **COENZYME** followed by 0.7 ml of **ADJUST-BUFF**. The total volume of the Enzyme Solution is 2.0 ml.

The Enzyme Solution has to be prepared freshly prior to the assay (not longer than 10 – 15 minutes in advance). Discard after use!

Noradrenaline Microtiter Strips

In rare cases residues of the blocking and stabilizing reagent can be seen in the wells as small, white dots or lines. These residues do not influence the quality of the product.

Acylation Reagent

The **ACYL-REAG** (BA E-6612) has a freezing point of 18.5 °C. To ensure that it is liquid when being used, it must be ensured that the Acylation Reagent has reached room temperature and forms a homogeneous, crystal-free solution before being used.

6.2 Sample preparation

The NORADRENALINE high sensitive ELISA is a flexible test system for various biological sample types and volumes. It is not possible to give a general advice how to prepare the samples. However, the following basics should help the researcher to fit the protocol to his specific needs.

- Avoid excess of acid: excess of acid might exceed the buffer capacity of the extraction buffer. A pH > 7.0 during the extraction is mandatory.
- Prevent noradrenaline degradation by adding preservatives to the sample (see *Sample collection, handling and storage*).
- Avoid chaotropic chemicals like perchloric acid. The high salt content might reduce the recovery of noradrenaline. If your samples already contain high amounts of perchloric acid, neutralize the sample prior to the extraction step.
- Tissue samples can be homogenised in 0.01 N HCl in the presence of EDTA and sodium metabisulfite. Under these conditions, noradrenaline is positively charged which reduces binding to proteins and optimizes solubility.
- Avoid samples that contain substances with a cis-diol structure. These will reduce the recovery of noradrenaline.
- It is advisable to perform a "Proof of Principle" to determine the recovery of noradrenaline in your samples. Prepare a stock solution of noradrenaline. Add small amounts (to change the native sample matrix as less as possible) of the stock solutions to the sample matrix and check the recovery.
- The used sample volume determines the sensitivity of this test. Determine the sample volume needed to determine the noradrenaline in your sample by testing different amounts of sample volume.

If you need any support in establishing a protocol for your specific purposes, do not hesitate to contact the manufacturer directly!

6.3 Extraction and acylation

The NORADRENALINE high sensitive ELISA offers a flexible test system for various biological sample types and volumes. Step 1 of the extraction procedure depends on the sample volume:

- in case you have sample volumes between 1 100 µl follow **1.1**
- in case you have sample volumes between 100 500 µl follow **1.2**
- in case you have sample volumes between 500 750 µl follow **1.3**

^AWithin a run it is only possible to measure samples with the same volume!

1.3 le volume 500 – 750 μl e into the respective wells EXTRACT-PLATE 48:					
into the respective wells					
EXTRACT-PLATE 48:					
standards, controls and					
750 µl sample.					
each well with water ized, distilled, or ultra- to a final volume of [e.g. 10 µl standard plus water (deionized, d, or ultra-pure)].					
er (approx. 600 rpm).					
ate on absorbent					
material.					
Blot dry by tapping the inverted plate on absorbent material.					
Cover plate with FOILS . Shake 10 min at RT (20 – 25 °C) on a shaker (approx. 600 rpm).					
Do not decant the supernatant thereafter!					
c conversion.					
to the respective wells of					
Add 25 µl of Enzyme Solution (refer to 6.1) to all wells.					

Incubate for 2 h at 37 °C. The following volumes of the supernatants are needed for the subsequent ELISA:

Noradrenaline 100 µl

6.5 Noradrenaline ELISA

- **1.** Pipette **100 μl** of **standards**, **controls** and **samples** from the **Enzyme Plate** (refer to 6.4) into the respective pre-coated **Noradrenaline Microtiter Strips <u>W**</u>**NAD<u>NMN**</u>.
- 2. Pipette **50 µl** of the respective **NAD-AS** into all wells.
- **3.** Cover the plate with **FOILS**. Shake **1 min** at **RT** (20 25 °C) on a **shaker** (approx. 600 rpm).
- 4. Incubate for 15 20 h (overnight) at 2 8 °C.
- Remove the foil. Discard or aspirate the content of the wells. Wash the plate 4 x by adding 300 μl of Wash Buffer, discarding the content and blotting dry each time by tapping the inverted plate on absorbent material.
- 6. Pipette 100 µl of CONJUGATE into all wells.
- **7.** Incubate **30 min** at **RT** (20 25 °C) on a **shaker** (approx. 600 rpm).
- Discard or aspirate the content of the wells. Wash the plate 4 x by adding 300 μl of Wash Buffer, discarding the content and blotting dry each time by tapping the inverted plate on absorbent material.
- **9.** Pipette **100 µl** of **SUBSTRATE** into all wells.
- **10.** Incubate **20 30 min** at **RT** (20 25 °C) on a **shaker** (approx. 600 rpm).
- Avoid exposure to direct sunlight!
- **11.** Pipette **100** µl of **STOP-SOLN** into all wells.
- **12. Read** the absorbance of the solution in the wells within 10 minutes, using a microplate reader set to **450 nm** (if available a reference wavelength between 620 nm and 650 nm is recommended).

7. Calculation of results

The standard curve, which can be used to determine the concentration of the unknown samples, is obtained by plotting the absorbance readings (calculate the mean absorbance) of the standards (linear, y-axis) against the corresponding standard concentrations (logarithmic, x-axis) using a concentration of 0.001 ng/ml for Standard A (this alignment is mandatory because of the logarithmic presentation of the data). Use non-linear regression for curve fitting (e.g. 4-parameter, marquardt).

This assay is a competitive assay. This means: the OD-values are decreasing with increasing concentrations of the analyte. OD-values found below the standard curve correspond to high concentrations of the analyte in the sample and have to be reported as being positive.

The concentrations of the samples taken from the standard curve have to be multiplied by a correction factor.

Correction factor = 10 µl (volume of standards extracted) sample volume (µl) extracted

Example

750 μl of the sample is extracted and the concentration taken from the standard curve is 0.45 ng/ml noradrenaline.

Correction factor = 10/750 = 0.013

Concentration of the sample = $0.45 \text{ ng/ml} \times 0.013 = 0.006 \text{ ng/ml} = 6 \text{ pg/ml}$ noradrenaline

Conversion:

Noradrenaline [ng/ml] x 5.91 = Noradrenaline [nmol/l]

7.1 Quality control

The confidence limits of the kit controls are indicated on the QC-Report.

8. Assay characteristics

Sensitivity (Limit of Detection)

Noradrenaline

0.1 ng/ml x C*

C* = Correction factor (refer to 7.)

Analytical Sensitivity (750 µl undiluted sample)

Noradrenaline

1.3 pg/ml

Functional Sensitivity (750 µl undiluted sample)				
Noradrenaline 2 pg/ml				

Analytical Specificity (Cross Reactivity)				
Substance	Cross Reactivity [%]			
Substance	Noradrenaline			
Derivatized Adrenaline	0.14			
Derivatized Noradrenaline	100			
Derivatized Dopamine	0.2			
Metanephrine	< 0.003			
Normetanephrine	0.48			
3-Methoxytyramine	< 0.003			
3-Methoxy-4-hydroxyphenylglycol	0.01			
Tyramine	< 0.003			
Phenylalanine, Caffeinic acid, L- Dopa, Homovanillic acid, Tyrosine,				
3-Methoxy-4-hydroxymandelic acid	< 0.003			

Precision						
Intra-Assay Human EDTA-Plasma						
	Sample	Mean ± 3 SD [pg/ml]	SD [pg/ml]	CV [%]		
Noradrenaline	high	1,377.4 ± 483.6	161.2	11.7		
	medium	502.6 ± 126.9	42.3	8.4		
	low	32.7 ± 15.3	5.1	15.6		

Precision						
Intra-Assay Cell Culture Medium (RPMI)						
	Sample	Mean ± 3 SD [pg/ml]	SD [pg/ml]	CV [%]		
Noradrenaline	high	2,027.8 ± 712.5	237.5	11.7		
	medium	716.5 ± 179.7	59.9	8.4		
	low	46.0 ± 16.8	5.6	12.2		

Recovery Noradrenaline						
	Mean [%]	Range [%]	SD [%]	CV [%]		
Human EDTA-Plasma	116.5	104.8 - 125.6	8.0	6.9		
Cell Culture Medium	96.7	70.6 - 124.7	17.1	17.7		

 \triangle For literature or any other information please contact your local supplier.

 \triangle The liability of the manufacturer shall be limited to the replacement of defective products. The manufacturer takes no liability for any damages or expenses arising directly or indirectly from the use of this product.

Symbols:

